4

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/542,942	03/31/2000	Stephen S. Ho	M0635/7065 (RJK)	4931

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EXAMINER	
ABDULSELAM, ABBAS I	
ART UNIT	**PAPER NUMBER**
2674	

DATE MAILED: 02/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/542,942	Applicant(s) HO ET AL.	
	Examiner Abbas I Abdulselam	Art Unit 2674	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 October 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5-8,10-27,30-33 and 35-66* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-8,10,17-23,25-27,30-32,35,37-39,43,47,48 and 52-66* is/are rejected.

7)☐ Claim(s) *11-16,24,33,36,40-42,44-46 and 49-51* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 62-66 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 62-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillio (USPN 5800177).

Regarding claims 62, Gillio teaches as shown in FIG. 7, FIGS. 8A and 8B, FIG. 9A and FIG. 9B a "joystick" or other desktop input device for a computer for a virtual reality simulation device. Gillio discloses that the joystick illustrated in FIG. 7 allows one to use a joystick having a better virtual movement in three dimensions. Specifically, the joystick of FIG. 7 allows movement in the x, y, z, pitch, roll, yaw and rotation directions. Gillio discloses that a force feedback is provided when the joystick shaft 406 is moved to a point where a collision occurs with the image data stored in the memory of the computer. Furthermore, Gillio teaches using collision and detection software, and states upon deflection of the shaft 406, a device such as gauge 450 may be used to determine the deflection thereof, or electrical signal 452 may be provided from the spring to the computer 110 to determine the deflection. See col. 9, line2 20-67

and col. 10, lines 1-55.

Gillio does not specifically teach providing haptic feedback of the user by providing a correction force to the haptic interface device based on at least one of a posture map of the first object and at least one guide zone"

However, as mentioned above, Gillio teaches the joystick illustrated in FIG. 7, which allows one to use a joystick having a better virtual movement in three dimensions. Specifically, the joystick of FIG. 7 allows movement in the x, y, z, pitch, roll, yaw and rotation directions. It would have been obvious to utilize Gillio's joystick movement to determine the location and orientation of the joystick in the space. It would also have been obvious to utilize Gillio's joystick movement along with appropriate collision detection software to determine the manner by which the joystick collides. One would have been motivated in view of the suggestion in Gillio that joystick's movement as illustrated in Fig. 7 along with appropriate collision detection software would equivalently yield the functional equivalence of the desired guide zone and posture map.

Regarding claims 53 and 63, Gillio teaches that the joystick may be used for other simulation implementations or general computer game, which includes seven degrees of freedom as, illustrated in FIG. 7 (col. 9, lines 50-53).

Regarding claim 64, Gillio teaches the joystick of FIG. 7 allowing movement in the x, y, z, pitch, and roll, yaw and rotation directions (col. 9, lines 56-57).

Regarding claim 65-66, it would also have been obvious to utilize Gillio's joystick movement along with appropriate collision detection software.

3. Applicant's arguments with respect to claims -3, 5-8, 10, 17-23, 25-27, 30-32, 35, 37-39, 43, 47-48 have been considered but are moot in view of the new ground(s) of rejection.

4. Claims 1-3, 5-8, 10, 17-23, 25-27, 30-32, 35, 37-39, 43, 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Killpatrick (Dissertation) in view of Matsuda et al. (USPN 5768565) and Basdogan et al. (USPN 6704694).

Regarding claims 1,10, 26, 35, 43 and 47, Killpatrick teaches a system allowing a user to manipulate blocks such that when collisions between virtual objects occur, or virtual tong grasp a virtual block, simple audible cues (clicks) are presented (page 16). Killpatrick illustrates in Fig. 2.7, tongs being positioned above a block, and a shadow surrounding the block, Killpatrick also illustrates, the tong surrounding the block (Fig. 2.8), the block after it has been grasped by the tongs (Fig. 2.9), and shows the scene with just tongs and the blocks (Fig. 2-11) as well a scene with table added to it (2.12). See page 32. Further, Killpatrick teaches an application software with Interdata/3 (having 8K bytes of core memory (page 22)), constantly calculating the position and orientation of a master arm handgrip (see page 21) as originally conceived. Killpatrick teaches that the Interdata/3 program calculates among others only quantities associated with the physical handgrip (page 41 and 43). Killpatrick teaches S/360 as a driving force in the system that reads the data from the Interdata/3. Killpatrick further adds that the values of YAW, PITCH and ROLL are calculated from a rotation matrix and all new data inserted into the structure. Moreover, Killpatrick indicates that MOVE checks for collisions or grasps, updates velocities of moving objects and calculates a new output force and related parameters (Pages 343-44). Killpatrick teaches six rotation matrices, wherein two compositions of matrices corresponding to

X, Y and Z are used to calculate the position of the wrist point, and three matrices are used to find a vector from the wrist point to the base of the handgrip such that all six matrices are composed to give orientation matrix for the handgrip. (See Pages 44, 46 and fig. 2-19).

Killpatrick does not teach storing a plurality of postures of the tool to form a posture map. Matsuda et al. (USPN 5768565) on the other hand teaches the environment information memory section (14) storing the environment information of each object through the input section 11. Matsuda discloses that the environment information is comprised of position, posture (orientation), surface (polygon) and peak (vertex) coordinates of each polygon of each object in three-dimensional virtual space. See Fig. 6.

It would have been obvious to modify Kilpatrick's system of collisions between virtual objects to incorporate Mastuda's environment information along with its memory section (14) for the purpose of storing data representing multiple dimensions in three-dimensional virtual space.

Killpatrick does not teach representation in terms of "niceness factors". Basdogan et al. (USPN 6704694) on the other hand teach that using the ray-based rendering technique, one can compute the contact points, depth of penetration, and the distances from the contact points to both the ends of the probe. Then, this information can be used to determine the forces and torques that will be displayed to the user.

It would have been obvious to modify Kilpatrick's system of collisions between virtual objects to incorporate Basdogan's ray-based rendering technique in order to represent points of interest in collision between a simulated tool and 3D objects.

Regarding claims 2 and 27, Killpatrick teaches the Interdata/3 program reading seven

input signals out of which six of those voltages represent an angular displacement of six degrees of freedom from the reference position. See page 44.

Regarding claims 5 and 22, Killpatrick teaches the block after it has been grasped by the tongs (Fig. 2.9).

Regarding claims 6, 17 and 31, Killpatrick teaches that a viewpoint can be placed anywhere in front of a screen by picking an appropriate values for A, B and C.

Regarding claims 7, 18-19, 23 and 39, Killpatrick teaches Interdata/3 having 8K bytes of core memory (page 22)), and discloses that the Interdata/3 program calculates among others only quantities associated with the physical handgrip (page 41 and 43).

Regarding claims 3, 20-21, 25, 30 and 48, Killpatrick teaches "MOVE" checking for collisions or grasps, updates velocities of moving objects and calculates a new output force and related parameters (Pages 343-44).

Regarding claim 32, as mentioned above, Basdogan teaches the ray-based rendering technique.

Regarding claims 8 and 37-38, Killpatrick teaches an application software with Interdata/3 (having 8K bytes of core memory (page 22)), constantly calculating the position and orientation of a master arm handgrip (see page 21) as originally conceived. Killpatrick teaches that the Interdata/3 program calculates among others only quantities associated with the physical handgrip (page 41 and 43).

5. Applicant's arguments with respect to claims 52-61 have been fully considered but they are not persuasive.

Applicant argues that the cited references Shih et al. (USPN 6421048) and of Xavier (USPN 6407748) alone or in combination dot not teach "a posture map" and a "guide zone". However, as mention in the art rejection below, Xavier teaches as shown in Table 4, a configuration of a rigid body in a particular position and orientation when bodies R and S are placed to be subjected to translations X and Y.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify shih interaction of virtual objects to incorporate Xavier's position and orientation description shown in Fig. 4 for the purpose of distance determination in three-dimensional space. Furthermore, Shih teaches a virtual tool (28) which is a software object determining if contact has occurred with a virtual object (26) and determining the surface direction vector (101). Shih discloses that the vector and density computations are used to project any point within the virtual object (26) to the virtual surface (25) of the virtual object (26) in order that the potential surface contact point (226) is calculated. See col. 17, lines 46-54 and Fig. 12.

6. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shih et al. (USPN 6421048) in view of Xavier (USPN 6407748).

Regarding claim 52, Shih teaches a user, a hepatic interface device (10), virtual object (26), an interaction with a virtual object, and a force feedback produced by the haptic rendering process. See col. 5, lines 13-16. Shih teaches a virtual surface (25) of a virtual object (26) and a virtual tool guided by the user using haptic interface device (10). See Fig 2B. Shih teaches tool

points that are stored in a separate point array of local points intended to represent the tool. See col. 26, lines 29-35 Furthermore, Shih teaches a scenario where a user is moving the haptic interface device so that the virtual tool (28) is moving toward the virtual surface 25 of the virtual object (26). See Fig 5A. In addition, Shih teaches collision detection between a virtual tool (28) and a virtual object (26) and the resulting forces that form a collision, depth of penetration and direction of the impact. See col. 18, lines 61-67. Shih further teaches calculations of a vector (101) from a point (S3, S4) from direction of a movement and points of penetration. See Fig 5 (B-C). Moreover, Shih teaches haptic rendering process (16) that determines the vector (101) and an interaction force to be applied with respect to a user movement of the virtual tool and the resulting feedback force. See col. 14, lines 41-68, col.1, lines 24-35, Fig 5C, Fig (8A-C), col. 8, lines 58-63, col.10, lines 43-46. Shih does not teach the use of a "posture map". Xavier on the other hand teaches as shown in Table 4, a configuration of a rigid body in a particular position and orientation when bodies R and S are placed to be subjected to translations X and Y.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify shih interaction of virtual objects to incorporate Xavier's position and orientation description shown in Fig. 4 for the purpose of distance determination in three-dimensional space.

Shih teaches a virtual tool (28) which is a software object determining if contact has occurred with a virtual object (26) and determining the surface direction vector (101). Shih further teaches that the vector and density computations are used to project any point within the virtual object (26) to the virtual surface (25) of the virtual object (26) in order that the potential surface contact point (226) is calculated. See col. 17, lines 46-54 and Fig. 12.

Regarding claim 53, Shih teaches an interface device (10) sensing six degree of freedom and haptic rendering process (16) determining geometry of the virtual surface. See col. 8, lines 58-63 and col. 10, lines 43-46.

Regarding claims 54-60, Shih teaches a virtual tool (28) which is a software object determining if contact has occurred with a virtual object (26) and determining the surface direction vector (101). See col. 5, lines 53-56. Shih further teaches calculations of a vector (101) from a point (S3, S4) from direction of a movement and points of penetration. See Fig 5 (B-C). Moreover, Shih teaches haptic rendering process (16) that determines the vector (101) and an interaction force to be applied with respect to a user movement of the virtual tool and the resulting feedback force. See col. 14, lines 41-68.

Allowable Subject Matter

7. Claims 11-16, 24, 33, 36, 40-42, 44-46, 49-51 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the

THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communication from the examiner should be directed to **Abbas Abdulselam** whose telephone number is **(703) 305-8591.** The examiner can normally be reached on Monday through Friday (9:00-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Patrick Edouard** can be reached at **(703) 308-6725**

Any response to this action should be mailed to:

Commissioner of patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314

Hand delivered responses should be brought to Crystal Park II, Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology center 2600 customer Service office whose telephone number is (703) 306-0377.

Abbas Abdulselam

Examiner

Art Unit 2674

February 19 2005

Xiao Wu

XIAO WU
PRIMARY EXAMINER